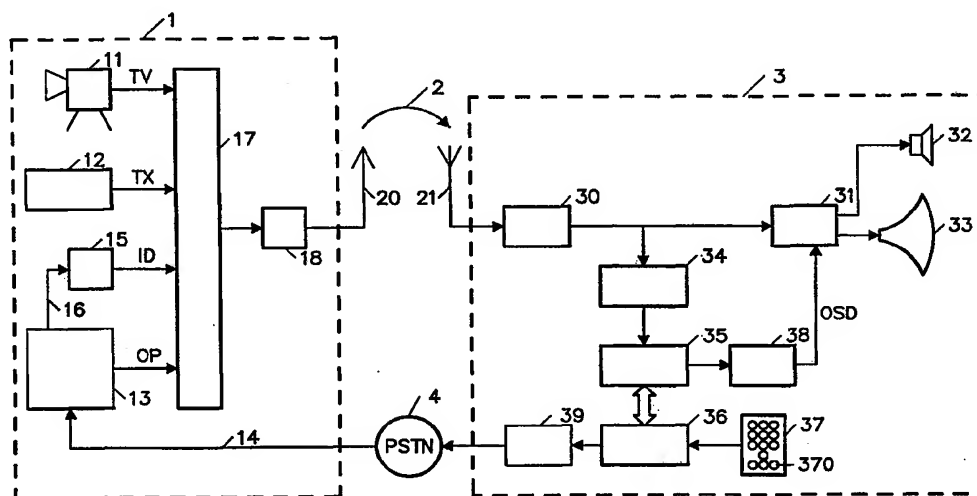




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(54) Title: INTERACTIVE TELEVISION TRANSMISSION SYSTEM**(57) Abstract**

Interactive television transmission system including a television transmitter (1) and at least one television receiver (3). Along with the television program (TV), the transmitter transmits operational signals (OP) defining actions to be taken by the receiver upon user participation. In accordance with the invention, the transmitter comprises means (15) for transmitting an indication signal (ID) to indicate that the television program is an interactive program, e.g. in a teletext packet 8/30. The receiver is arranged to receive and detect said indication signal and generate a perceptible indication (OSD) in response to said detection to inform the user about the type of program and activate the relevant processing circuitry (36).

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Interactive television transmission system.

The invention relates to an interactive television transmission system including a television transmitter and at least one television receiver. The transmitter includes means for transmitting television signals, and means for transmitting operational signals for an interactive operation mode of the television receiver. The receiver includes means for
5 receiving and reproducing said television signals. The invention also relates to a transmitter and a receiver for use in such a system.

A known interactive television transmission system as referred to in the opening paragraph is disclosed in international patent application WO-A 93/10605. In this
10 prior art system, the user can interact with a television program. To that end, operational signals defining actions to be taken by the receiver upon user participation are transmitted in the vertical blanking interval of the television signal. The prior art receiver includes a set-top box for that purpose, i.e. dedicated processing circuitry for processing the operational signals and enabling interactive participation. The processing circuitry also implicitly informs the
15 user that an interactive television program is being broadcast.

It is an object of the invention to further improve the interactive television transmission system.

To that end, the system is characterized in that the transmitter is arranged to transmit an indication signal indicating that the operation signals are transmitted, and that the
20 receiver comprises means to receive and detect said indication signal and generate a perceptible indication in response to said detection. Herewith it is achieved that the broadcast of an interactive television program is indicated to the user without the operational signals having to be processed. A further advantage of the invention is that processing the operational signals can be dispensed with if the user does not wish to participate in the
25 interactive programs. More in particular, the processing circuit can then be used for other purposes, inter alia, for advance-capturing of teletext pages which are also transmitted in the vertical blanking interval of the television signal. The invention also renders it possible for manufacturers to develop and produce television receivers which are not adapted to process the operational signals but detect the indication signal and display a message encouraging the

user to upgrade his receiver if he wishes to participate in interactive television programs.

In an embodiment of the invention, the indication signal is repetitively transmitted at regular time intervals, for example, once per second. A considerable reduction of transmission capacity is achieved herewith and the user is nevertheless adequately and
5 timely informed about the availability of the interactive operation mode, irrespective of whether the operation mode becomes available while he is watching a certain channel or is already available at a channel that he has just selected. In a preferred embodiment, the indication signal is a predetermined bit pattern in a predetermined teletext packet, for example, packet 8/30 of the World System Teletext standard.

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Fig.1 shows an interactive television transmission system according to the invention.

Fig.2 shows a part of the television signal waveform transmitted by a transmitter which is shown in Fig.1.

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Fig.3 shows a flowchart of a control program executed by a microprocessor which is shown in Fig.1.

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Fig.1 shows an interactive television transmission system according to the invention. The system comprises a television transmitter 1, a broadcast channel 2, an interactive television receiver 3 and a backwards channel 4. The broadcast channel 2 may also be a storage medium such as a magnetic tape or optical disk on which a television program is stored. The backwards channel is here assumed to be the public switched telephone network (PSTN).

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The transmitter 1 comprises a television program signal source, which is represented here by a television camera 11 generating a conventional television signal TV. The transmitter further comprises a teletext generator 12 which generates a teletext signal TX in a conventional manner, i.e. using lines in the vertical blanking interval of the television signal. The television program is supposed to be a quiz show in which the public may participate by sending answers to the questions. To that end, a computer system 13 generates operational signals OP in the form of data sequences defining actions to be taken by the
30 receivers in response to participation by the user. For example, the data sequences define a telephone number to be called by the receivers, identify how the user's response is to be encoded in the telephone call, and specify a time interval during which answers may be given. The operational signals are transmitted in a teletext-like manner in the vertical blanking interval of the television signal. In order to receive the phone calls from the public,

the computer system 13 is coupled to the public switched telephone network 4 through telephone connections 14. In accordance with the invention, the transmitter further comprises means 15 for generating an identification signal ID which indicates that an interactive television program is being broadcast. The means 15 are controlled by the computer system 13 through a connection 16. The television signal TV, teletext signal TX, identification signal ID, and operational signals OP are combined in a combiner stage 17 and collectively applied to a modulator 18 for RF transmission via an antenna 20.

Fig.2 shows a part of the television signal waveform transmitted by the transmitter. Reference numeral 25 denotes the vertical blanking interval of the television signal which comprises, in a 625-line system, lines 6-22 of one field and lines 318-335 of the other field. In the present example, reference numeral 26 denotes teletext data packets. Numeral 27 denotes operational signals in the form of data sequences which are only transmitted if the television program is an interactive program. Numeral 28 denotes one of the lines of the active video interval carrying the conventional analog video signal.

Each of the teletext packets 26 comprises a 3-bits magazine number and a 5-bits row number. Packets having a row number in the range 0-24 define display rows. A teletext data packet having magazine number 8 and row number 30 is transmitted once per second. Such a packet 8/30 is generally referred to as a broadcast service data packet. It comprises, inter alia, the initial teletext page to be captured, the current time, a network identification, a program label, etc. Some bits of the broadcast service data packet are not yet defined. In accordance with the invention, one or more of these bits (denoted 29 in Fig.2) are used to indicate that the operational signals 27 are transmitted, i.e. that the television program is an interactive program.

Returning to Fig.1, the transmitted signal is received by the receiver 3 through an antenna 21 and demodulated by a tuner 30. The tuner applies the demodulated baseband signal to conventional audio and video processing circuitry 31 to reproduce the TV program through a loudspeaker 32 and a display screen 33. The baseband signal is further applied to a data slicer 34 which extracts the data embedded in the vertical blanking interval of the signal and stores said data in a buffer section of a memory 35. The memory 35 is coupled to a microprocessor 36 which receives user commands from a (remote) control unit 37 and is further coupled, via a modem 39, to the telephone network 4. The memory 35 also includes a display section. Data stored in this display section by the microprocessor 36 is converted into on-screen-display signals OSD for display on the screen 33. It will be appreciated that

the microprocessor may also generate an audible signal in this manner and apply it to the loudspeaker 32.

The operation of receiver 3 will now be explained with reference to Fig.3 which shows a flowchart of a control program executed by microprocessor 36. As already mentioned, the data packets transmitted in the lines of the vertical blanking interval (i.e. the packets 26 and 27 shown in Fig.2) are stored in a buffer section of memory 35. They are processed by the microprocessor during the active video interval.

In an initial step 300 of the control program, an Interactive TV flag ITV is assigned the initial value 0. In a step 301, the microprocessor awaits the end of the vertical blanking interval. In a step 302, a packet received in the vertical blanking interval is read from the buffer section of memory 35. In a step 303, it is determined whether the packet is a teletext broadcast service packet 8/30. If that is the case, it is checked in a step 304 whether the indication signal ID is transmitted by the transmitter (see Fig.1). This step includes determining the value of the special bit or multibit code 29 which is shown in Fig.2. If the indication signal ID is detected, the flag ITV is assigned the value 1 in a step 305 so as to internally store the information that the current television program is an interactive program. In a step 306, an On-Screen-Display signal OSD (see Fig.1) is generated so as to inform the user that he can participate in the program if he wishes. If the indication signal ID has not been detected in packet 8/30, the flag ITV is reset (step 307) and the OSD signal is not generated or switched off (step 308).

After processing a packet, it is checked in a step 309 whether all packets received in the buffer section of the memory have been processed. As long as that is not the case, the control program returns to step 302 to process the next packet. Otherwise, the program returns to step 301 to await the end of the next vertical blanking interval and process a next burst of data.

If the data packet is not a broadcast service packet, the program determines whether the television program is an interactive program by testing the flag ITV in a step 310. If the program is not interactive ($ITV=0$), the microprocessor executes a teletext operation program 311. By this program, the teletext data packets TX (26 in Fig.2) are captured and decoded so as to store a plurality of teletext pages in the memory for immediate access in a teletext operation mode. Operational signals OP (27 in Fig.2) need not be processed in this case because they are not transmitted.

If the program is interactive ($ITV=1$), it is determined in a step 312 whether

the user actively participates in the program. The step 312 includes checking whether a key 370 (see Fig.1) of the receiver is pressed or has been pressed before. If the program is interactive but the user does not participate, the teletext operation program 311 mentioned above is executed. Although operational signals OP are available, they need not be processed in this case. If the program is interactive and the user participates, an interactive operation mode is activated. In this operation mode, the operational signals OP (27 in Fig.2) are processed by the microprocessor in accordance with a program 313. Optionally, the step 312 of checking whether the user indeed participates may be omitted. This allows the receiver to process the operational signals OP in advance, thus anticipating the user's participation at a later stage.

As can readily be understood from the above description, processing of the operational signals (which may be a complex and time-consuming operation) is performed only when the TV program is indeed interactive. Processing is not required for the generation of the OSD signal. Accordingly, as long as a program is not interactive, the relevant processing circuitry (in the present example, the microprocessor) is relieved of processing the operational signals and can perform other tasks instead.

In summary, an interactive television transmission system is disclosed which includes a television transmitter (1) and at least one television receiver (3). Along with the television program (TV), the transmitter transmits operational signals (OP) defining actions to be taken by the receiver upon user participation. In accordance with the invention, the transmitter comprises means (15) for transmitting an indication signal (ID) to indicate that the television program is an interactive program, e.g. in a teletext packet 8/30. The receiver is arranged to receive and detect said indication signal and generate a perceptible indication (OSD) in response to said detection to inform the user about the type of program and activate the relevant processing circuitry (36).

Claims

1. An interactive television transmission system including a television transmitter and at least one television receiver, the transmitter including:

- means for transmitting television signals,
- 5 - means for transmitting operational signals for an interactive operation mode of the television receiver,

and the receiver including:

- means for receiving and reproducing said television signals,

10 characterized in that the transmitter is arranged to transmit an indication signal indicating that said operation signals are transmitted, and that the receiver comprises means to receive and detect said indication signal and generate a perceptible indication in response to said detection.

2. A system as claimed in claim 1, characterized in that the indication signal is repetitively transmitted at regular time intervals.

15 3. A system as claimed in claim 2, characterized in that the indication signal is a predetermined bit pattern in a predetermined teletext packet.

4. An interactive television transmitter including:

- means for transmitting television signals to at least one television receiver,
 - means for transmitting operational signals for an interactive operation mode of said
- 20 television receiver,

characterized in that the transmitter is arranged to transmit an indication signal to indicate that said operation signals are transmitted.

5. A transmitter as claimed in claim 4, characterized in that the indication signal is repetitively transmitted at regular time intervals.

25 6. A transmitter as claimed in claim 5, characterized in that the indication signal is a predetermined bit pattern in a predetermined teletext packet.

7. A television receiver having means for receiving and reproducing television signals transmitted by a television transmitter, characterized in that the receiver comprises means to receive and detect an indication signal indicating that operational signals for an

interactive operation mode of the receiver are transmitted, and means to generate a perceptible indication in response to said detection.

8. A receiver as claimed in claim 7 and including processing means for processing the operational signals in said interactive operation mode, characterized in that the receiver comprises user-operable means for activating said processing means if said indication signal is detected.

9. A receiver as claimed in claim 7, characterized in that the indication signal is repetitively received at regular time intervals.

10. A receiver as claimed in claim 9, characterized in that the indication signal is a predetermined bit pattern in a predetermined teletext packet.

11. A method of transmitting television signals to at least one television receiver, comprising the step of transmitting operational signals for an interactive operation mode of the television receiver, characterized by the step of transmitting an indication signal indicating that said operation signals are transmitted.

12. A method of receiving television signals from an interactive television transmitter, comprising the step of receiving and reproducing television signals transmitted by said television transmitter, characterized by the step of receiving and detecting an indication signal indicating that operational signals for an interactive mode of the receiver are transmitted, and by the step of generating a perceptible indication in response to said detection.

13. A television signal including operational signals for an interactive operation mode of a television receiver, characterized by an indication signal to indicate that said operation signals are included.

14. A storage medium in which a television signal as claimed in claim 13 has been stored.

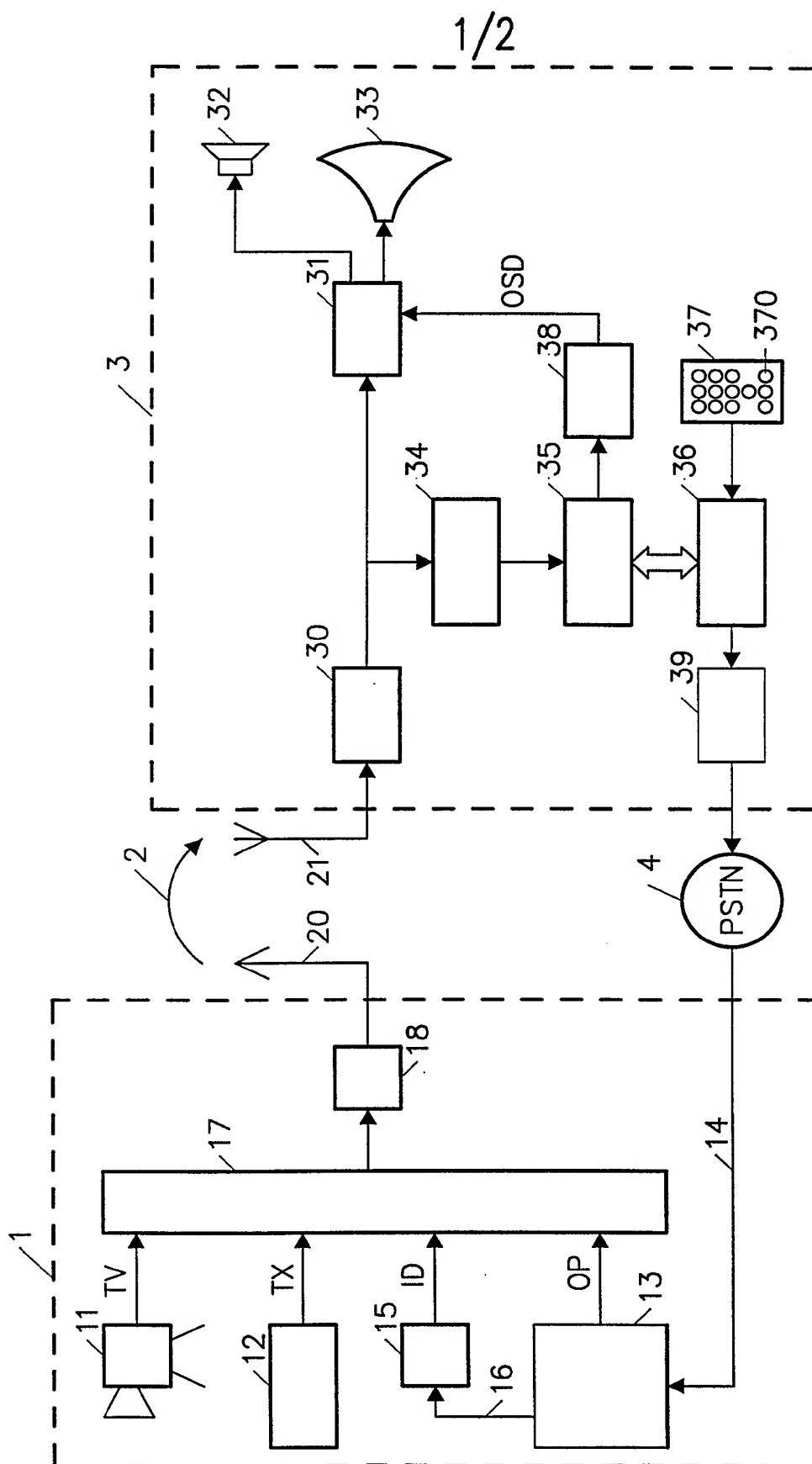


FIG. 1

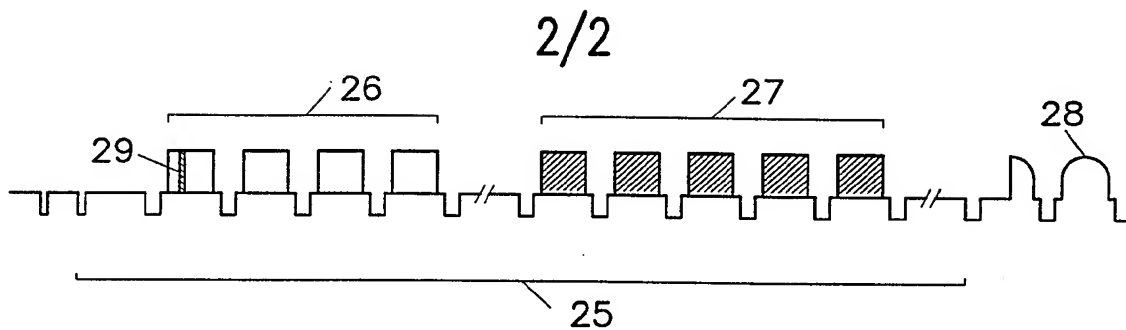


FIG. 2

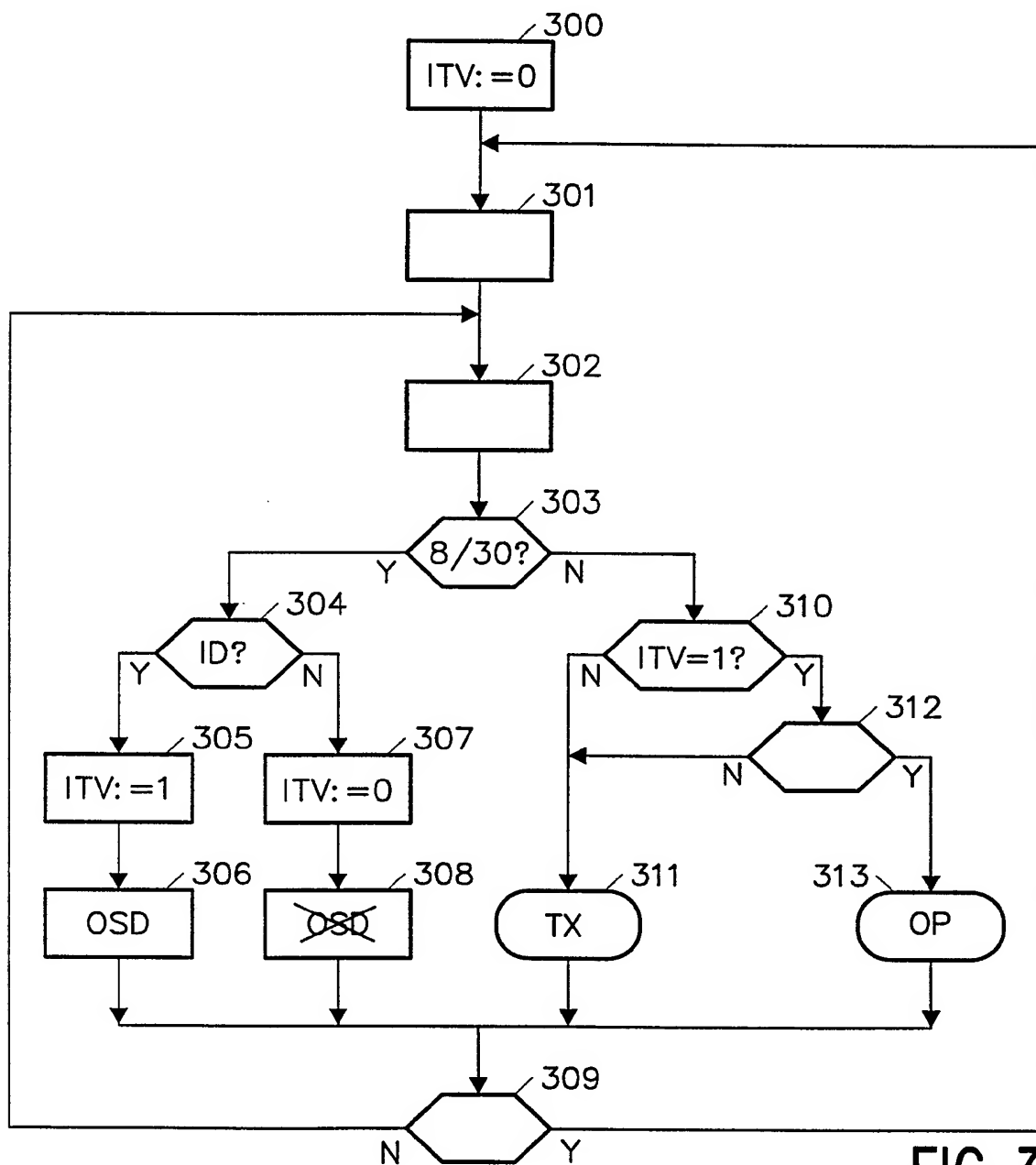


FIG. 3